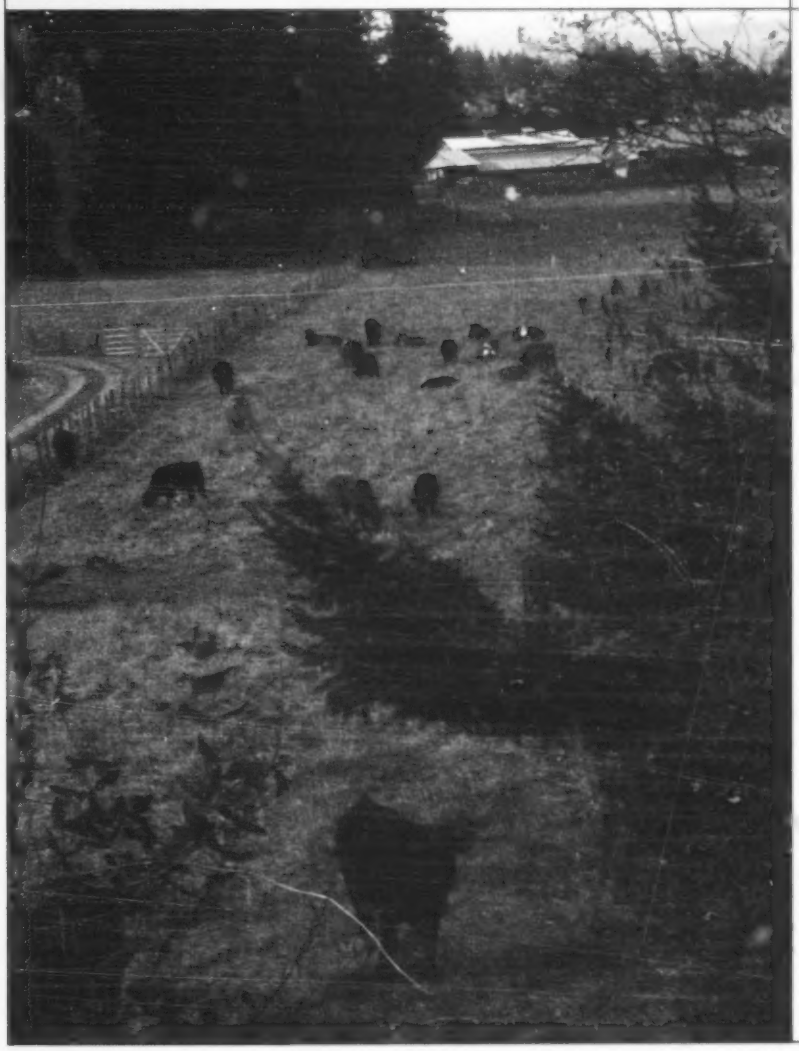
Applying best stubble heights on rangelands



RANGELAND HEALTH BROCHURE 6

BRITISH COLUMBIA

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URL: http://www.for.gov.bc.ca/hfp/range/range.htm

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Range use plans (RUPs), required for all *Range Act* agreements on Crown range, were changed substantially in 2003. Many plans will now have references to range readiness criteria,[1] average stubble heights, and browse utilization levels. This brochure explains the rationale for using stubble heights.

What is stubble height?

Stubble height is the height of herbaceous plants remaining after grazing or mechanical harvesting.

What is a key area?

A key area[2] is a small portion of a management unit selected as a monitoring site for grazing use. If chosen appropriately, it should reflect the overall acceptability of livestock use in the management unit as a whole. Key areas are no longer defined in legislation, but remain available as a management tool.

Key areas may be selected to monitor use levels (stubble height and browse utilization) to help determine when livestock should be moved to a new pasture to prevent over-use. This is especially applicable in riparian areas, where livestock use is often heavier than in adjacent uplands, or on forested cutblocks, where proper use levels and distribution are necessary to prevent damage to young conifer seedlings.

Figure 1 Cattle graze most efficiently when forage is about 15 cm high.

Why is stubble height and level of use important?

The grazing animal

Cattle graze most efficiently when plants are about 15 cm high. When the average forage height falls below 10 cm,

1 B.C. Ministry of Forests, Range Section. 2003. *Using range readiness criteria*. Rangeland Health Brochure 5.

2 Society for Range Management. 1989. Glossary of range terms.

cattle need to take more bites, travel farther, and graze longer to meet nutritional requirements. They will also by necessity switch to browsing the leaves and stems of shrubs and trees. If average forage height falls below 2 cm, daily intake will be reduced by 80%, and animal production will decline.

The forage plant

Not all plant species are equal. Some are more palatable to livestock and are preferentially selected because of texture and/or taste, while others are selected secondarily or avoided.

Some forage species are more resistant to grazing than others because of their growth form or the way they manage their carbohydrate reserves. Resistant grasses keep their growing points low to the ground and protected from the bite of the grazer. If the growing point remains intact, regrowth is faster. Rhizomatous species are able to share carbohydrate reserves between grazed and ungrazed tillers, making them well adapted to patchy utilization.

Figure 2 Cattle on riparian pasture. When grass is short, forage intake can drop by as much as 80%. Severe and repeated grazing leads to reduced plant vigour, shallower roots, and a change in plant species composition.

Not all plants share the same season of growth. Some are relatively early growers and begin their growth when soil and air temperatures are low, while other species are adapted to hotter conditions and grow during the heat of summer.

Plants compete for space, light, moisture, and nutrients. Grazed non-rhizomatous plants are at a competitive disadvantage compared to their ungrazed neighbours.

Sod-forming and rhizomatous grasses and sedges are also more resistant to trampling damage from livestock hooves than are bunchgrasses.

Grazing that removes more than half the leaf area of a grass plant will stop root growth.

Soils and watershed function

Capture

A proper stubble height is essential in maintaining watershed function. Stubble and litter aid in capturing moisture where it falls, protecting the soils from erosion and the drying effects of wind and sun, and in slowing the overland water flow.

Filtering of sediments and pollutants

Healthy riparian areas with adequate carry-over capture sediments and pollutants carried in overland water flow. The riparian zone is also where de-nitrification occurs.

Figure 3 A streamside riparian area with good carry-over.

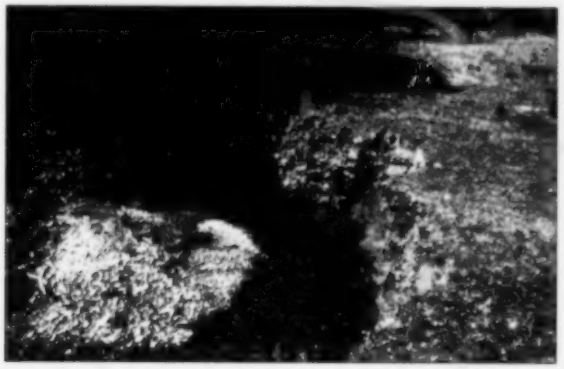

Figure 4 A streamside riparian area with no carry-over.

(a)

(b)

Figure 5 An over-utilized riparian zone (a) and an adjacent upland (b). The stubble height of Kentucky bluegrass is well below 10 cm on average. The meadow appears "slicked-off" rather than ragged. Note the heavy browsing of willows.

Figure 6 The sedge and cattail community in this wetland filters pollutants and sediments from overland flow.

Figure 7 Overgrazing has eliminated the sedge and cattail community from this wetland. Note also the poor cover on the adjacent upland area.

Storage and safe release of water

The precipitation captured in the uplands enters the soil and moves downslope to the riparian area where it is stored for later release into streams and wetlands. This controlled release of water prevents damaging flooding during rainfall events and keeps streams and wetlands from drying up during periods of drought.

Figure 8 The wetland portion of a beaver-controlled stream performs an important function in storing water for later release into the stream.

Cover for wildlife

Residual cover is important to wildlife, both for forage and for security from predators.

Figure 9(a) Ground-nesting birds require nesting and security cover.

Figure 9(b) Forage and security cover for ungulates.

How low can you graze?

Following are some rules of thumb:

- Plant species that keep their growing points low, such as Kentucky bluegrass, are more resistant to grazing than are species that elevate their growing points.
- Close grazing of large riparian sedge species will damage their crowns.
- Rhizomatous plants that share their carbohydrates are more resistant to grazing than are bunchgrasses.
- Sod-forming and rhizomatous species are more resistant to hoof damage than are bunchgrasses.
- Root growth stops when more than 50% of the available leaf area is removed.

Recommendations for some common grasses are found in Tables 1 and 2.

Table 1 Average stubble heights for riparian species

Species	Average stubble height (cm)
Baltic rush	10
Bluegrasses	10
Bullrushes	incidental use
Canada reedgrass (Bluejoint)	12
Cattails	incidental use
Desert saltgrass	7
Foxtail barley	10
Hairgrass, tufted	12
Kobresia	8
Sedges (large)	20
Spikerush	15

Table 2 Average stubble heights for upland species

Species	Average stubble height (cm)
Bluegrasses	8
Bromes (introduced)	10
Fescue, Altai	17
Fescue, creeping red	7
Fescue, Idaho	12
Fescue, rough	17
Needlegrasses	12
Orchardgrass	10
Pinegrass	15
Ricegrass, rough-leaved	8
Timothy, alpine	10
Timothy (domestic)	8
Wheatgrass, bluebunch	15
Wheatgrass, crested	8
Wheatgrass, northern	15
Wheatgrass, slender	15
Wheatgrass, western	12
Wildrye, blue	15

Recommendations

- Locate key areas that fairly represent the range or pasture unit as a whole.
- In these key areas, determine the grass forage species that will be used to determine use levels. These indicator species should be the most important forage species or the species most susceptible to grazing.
- Walk across the key area and measure stubble heights at a set interval, usually several paces. Generally, measurements of about 50 plants should be adequate.
- When the pre-determined stubble height is reached, cattle should be removed.

Figure 10 A properly utilized sedge plant about 20 cm high.

Figure 11 A properly utilized sedge meadow with an average stubble height of 20 cm and a ragged appearance.

Figure 12 An over-utilized sedge meadow with bare ground.

Figure 13 An over-utilized Idaho fescue that has been grazed to about 6 cm in height. Proper use is 12 cm.

Figure 14 A properly grazed crested wheatgrass pasture.

Figure 15 A properly grazed bluebunch wheatgrass plant. The middle portion of the plant has been grazed to about 13 cm, while the outer tillers are about 22 cm long.

A final word of caution

Stubble height observations should be part of an ongoing monitoring program. Remember to watch for changes in the plant community, as they may indicate that the range is being grazed improperly. Grazing that is too early, too frequent, or too severe will lead to:

- reduced plant vigour,
- a shallower root system and less resistance to drought,
- a change in plant species composition (a decline in the number of perennial grass plants and palatable forbs and an increase in weedy plant species), and
- an increase in bare ground.

The information gained from monitoring should be used to fine-tune our management and to help us avoid repeating past mistakes. Flexibility and adaptation are the keys to successful range management.

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